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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,093	10/22/2003	Jinru Bian	02005US	8299

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Rodel Holdings, Inc.  
Suite 1300  
1105 North Market Street  
Wilmington, DE 19899

EXAMINER

CHEN, ERIC BRICE

ART UNIT PAPER NUMBER

1765

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/692,093

Applicant(s)

BIAN, JINRU

Examiner

Eric B. Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Examiner's Amendment***

1. The previously authorized Examiner's Amendment of Nov. 2, 2005, canceling non-elected claim 10, has been rendered moot in view of the current rejection. Thus, the status of claim 10 stands as withdrawn from consideration.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-9 stand rejected under 35 U.S.C. 102(b) as being anticipated by Tsuchiya et al. (U.S. Patent Appl. Pub. No. 2001/0006224).
4. As to claim 1, Tsuchiya discloses method for removal of a barrier film on a semiconductor wafer by polishing with a polishing pad and a polishing fluid (paragraph 0058), the polishing fluid comprising abrasive particles in the range of 0.1% to 5% by weight (paragraph 0028) and an acid consisting of an organic acid or mixture thereof in the range of 0.5-10% by weight (paragraph 0050) in an aqueous solution at a pH of 7 to 12 ("preferably 9 or less," paragraph 0043). Tsuchiya discloses that an oxidizing agent "may be added" to the polishing slurry (paragraph 0045). Therefore, the oxidizing agent is optional and Tsuchiya includes an embodiment with no addition of an oxidizing agent.

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Tsuchiya also discloses that inorganic salts “may be at least one...” (paragraph 0029) and thus includes an embodiment with no addition of inorganic salts.

5. As to claim 2, Tsuchiya discloses that the organic acid is selected from the group consisting of carboxylic acids, hydrocarboxylic acids containing a hydroxyl group, and amino acids (paragraph 0046).

6. As to claim 3, Tsuchiya discloses that the organic acid is selected from the group consisting of citric acid, maleic acid, formic acid, acetic acid, propionic acid, butyric acid, valeric acid, acrylic acid, lactic acid, succinic acid malic acid, malonic acid, succinic acid, tartaric acid, phthalic acid, fumaric acid, lactic acid ( $\alpha$ -hydroxypropionic acid or  $\beta$ -hydroxypropionic acid), pimelic acid, adipic acid, glutaric acid, oxalic acid, salicylic acid, glycolic acid, tricarballic acid, and benzoic acid (paragraph 0047).

7. As to claim 4, Tsuchiya discloses that the amino acid is selected from the group consisting of glutamic acid, glutamic acid hydrochloride, sodium glutamate monohydrate, glutamine, glutathione, glycylglycine, alanine,  $\beta$ -alanine,  $\gamma$ -aminobutyric acid,  $\epsilon$ -aminocaproic acid, lysine, lysine hydrochloride, lysine dihydrochloride, lysine picrate, histidine, histidine hydrochloride, histidine dihydrochloride, aspartic acid, aspartic acid monohydrate, potassium aspartate, potassium aspartate trihydrate, tryptophan, threonine, glycine, cystine, cysteine, cysteine hydrochloride monohydrate, oxyproline, isoleucine, leucine, methionine, ornithine hydrochloride, phenylalanine, phenylglycine, proline, serine, tyrosine, valine, and a mixture of these amino acids (paragraph 0049).

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8. As to claim 5, Tsuchiya discloses that the said abrasive is silicon dioxide (paragraph 0028).
9. As to claim 6, Tsuchiya discloses that the organic acid is citric acid (paragraph 0047).
10. As to claim 7, Tsuchiya discloses that the amino acid is glutamic acid (paragraph 0049).
11. As to claim 8, Tsuchiya discloses that a metal corrosion inhibitor (or antioxidant) is added to the polishing solution (paragraph 0053).
12. As to claim 9, Tsuchiya discloses that the pH of the polishing fluid is in the range from of 7 to 11 ("preferably 9 or less," paragraph 0043).

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1-9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuchiya et al. (U.S. Patent Appl. Pub. No. 2001/0006224).
15. As to claim 1, Tsuchiya discloses method for removal of a barrier film on a semiconductor wafer by polishing with a polishing pad and a polishing fluid (paragraph 0058), the polishing fluid comprising abrasive particles in the range of 0.1% to 5% by weight (paragraph 0028) and an acid consisting of an organic acid or mixture thereof in

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the range of 0.5-10% by weight (paragraph 0050) in an aqueous solution at a pH of 7 to 12 ("preferably 9 or less," paragraph 0043). Tsuchiya also discloses that inorganic salts "may be at least one..." (paragraph 0029) and thus includes an embodiment with no addition of inorganic salts.

16. Tsuchiya does not expressly disclose that there is no addition of an oxidizing agent. Tsuchiya teaches that the oxidizing agent enhances polishing of the conductive metal (paragraph 0045). Moreover, Tsuchiya discloses that an oxidizing agent "may be added" to the polishing slurry (paragraph 0045) and thus, the oxidizing agent is optional and includes an embodiment with no addition of an oxidizing agent. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to mix a polishing fluid with no addition of an oxidizing agent. One who is skilled in the art would be motivated to mix a solution with only the necessary additives.

17. As to claim 2, Tsuchiya discloses that the organic acid is selected from the group consisting of carboxylic acids, hydrocarboxylic acids containing a hydroxyl group, and amino acids (paragraph 0046).

18. As to claim 3, Tsuchiya discloses that the organic acid is selected from the group consisting of citric acid, maleic acid, formic acid, acetic acid, propionic acid, butyric acid, valeric acid, acrylic acid, lactic acid, succinic acid malic acid, malonic acid, succinic acid, tartaric acid, phthalic acid, fumaric acid, lactic acid ( $\alpha$ -hydroxypropionic acid or  $\beta$ -hydroxypropionic acid), pimelic acid, adipic acid, glutaric acid, oxalic acid, salicylic acid, glycolic acid, tricarballic acid, and benzoic acid (paragraph 0047).

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19. As to claim 4, Tsuchiya discloses that the amino acid is selected from the group consisting of glutamic acid, glutamic acid hydrochloride, sodium glutamate monohydrate, glutamine, glutathione, glycylglycine, alanine,  $\beta$ -alanine,  $\gamma$ -aminobutyric acid,  $\epsilon$ -aminocarproic acid, lysine, lysine hydrochloride, lysine dihydrochloride, lysine picrate, histidine, histidine hydrochloride, histidine dihydrochloride, aspartic acid, aspartic acid monohydrate, potassium aspartate, potassium aspartate trihydrate, tryptophan, threonine, glycine, cystine, cysteine, cysteine hydrochloride monohydrate, oxyproline, isoleucine, leucine, methionine, ornithine hydrochloride, phenylalanine, phenylglycine, proline, serine, tyrosine, valine, and a mixture of these amino acids (paragraph 0049).

20. As to claim 5, Tsuchiya discloses that the said abrasive is silicon dioxide (paragraph 0028).

21. As to claim 6, Tsuchiya discloses that the organic acid is citric acid (paragraph 0047).

22. As to claim 7, Tsuchiya discloses that the amino acid is glutamic acid (paragraph 0049).

23. As to claim 8, Tsuchiya discloses that a metal corrosion inhibitor (or antioxidant) is added to the polishing solution (paragraph 0053).

24. As to claim 9, Tsuchiya discloses that the pH of the polishing fluid is in the range from of 7 to 11 ("preferably 9 or less," paragraph 0043).

***Response to Arguments***

25. Applicant's arguments (Applicant's Remarks, page 7), filed Oct. 4, 2005, regarding the rejection of claim 1-9 under 35 U.S.C. 102(b) as being anticipated by Tsuchiya and the rejection of claim 1-9 under 35 U.S.C. 103(a) as being unpatentable over Tsuchiya have been fully considered but they are not persuasive.

26. First, Applicant argues that Tsuchiya discloses the use of an organic salt (page 6). However, Tsuchiya discloses that the inorganic salt "may be at least one..." (paragraph 0029), suggesting that there is an embodiment in which inorganic salts are not used.

27. Second, Applicant argues that Tsuchiya teaches away from the claimed invention of the solution having no addition of oxidizing agents (page 7). While Tsuchiya teaches that the purpose of the organic acid is for "enhancing oxidation by the oxidizing agent," the reference also teaches a second purpose of "achieving stable polishing" (paragraph 0046). In other words, Tsuchiya discloses an embodiment with no oxidizing agent, but containing an organic acid for the purposes of achieving stable polishing. Although Tsuchiya's Examples either include: (1) inorganic salts with no oxidizing agent (Table 3); or (2) organic acids with an oxidizing agent (Table 4), the Examples are preferred embodiments, rather than limitations of Tsuchiya's disclosure.

***Conclusion***

28. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



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29. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Uchikura et al. (U.S. Patent No. 6,579,153) discloses a CMP solution for copper barrier films with organic acids and an optional oxidizing agent.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Chen whose telephone number is (571) 272-2947. The examiner can normally be reached on Monday through Friday, 8AM to 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EBC

Dec. 12, 2005

*EBC*

KADINE G. NORTON  
SUPERVISORY PATENT EXAMINER

*Norton*